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Novel platelet-based liquid biopsy for specific, early and safe colorectal cancer diagnosis

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Our cancer diagnosis tests are based on the detection of protein biomarkers present in platelets as a consequence of their interaction with circulatory tumor cells. Some of these biomarkers are specific to the cancer type and can be detected and identified with high sensitivity. We have explored this approach to develop a new test for colorectal cancer diagnosis. Colorectal cancer is one of the most common cancers, with around 1,4M new cases yearly worldwide. It is the leading cause of cancer-related mortality in industrialized nations, and early detection is paramount for patient survival. Comparing to current diagnosis methods, which are unpleasant and troublesome for patients, and expensive for the public health system in terms of personnel and facilities, our test is safe, minimally invasive and easy to implement in most clinical laboratories without additional investment needed. On top of this it will be highly sensitive and specific allowing for the detection of cancer at a very early stage. Discovery of the protein-based biomarkers from the platelets was performed using 2D-DIGE technology on clinical samples from The University Hospital Schleswig-Holstein in Lübeck, Germany and The Karolinska University Hospital in Stockholm, Sweden. The discovered biomarkers grouped as panels were then evaluated using OPLS-DA multivariate methodology. The selected biomarkers were then validated using Digi West technology at NMI, Tübingen, Germany and evaluated using OPLS-DA for prediction and machine learning algorithms for overall functionality as a diagnostic test. Data will be presented showing the overall sensitivity and specificities in the included patient groups early CRC stage I-II, and advanced CRC stage III-IV in relation to non-cancerous groups such as IBD and IBS and healthy controls.
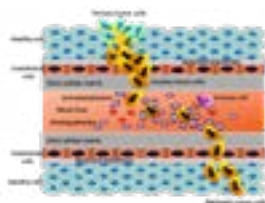

Fig: Platelets are activated when in contact with CTC's. Platelets are present in about 105 more than CTC's and do therefore result in high sensitivity. The changed expression profile of the inherent proteins does present a selective new fingerprint

Recent Publications

1. Julia M, et. al. (2014) What can proteomics tell us about platelets? Circulation Research 114(7):1204-19.

2. K Ghoshal, et. al. (2014) Overview of platelet physiology: its hemostatic and non-hemostatic role in disease pathogenesis. 2014(781857):16.

3. Lomnytska, et. al. (2018) Platelet protein biomarker panel for ovarian cancer diagnosis. Biomarker Research 6:2.

4. Strohkamp, et. al. (2017) Protein levels of clusterin and glutathione synthetase in platelets allow for early detection of CRC. Cell. Mol. Life Sci. 75(2):323-334.

Biography

Gert Auer has a long-standing experience in the field of proteomics and protein marker-based cancer diagnostics. Based on his decades of work as an oncology pathologist he is very focused on solving the serious risks associated with diagnostic tissue biopsy of cancerous lesions. Part of his research is therefore focused on liquid-based cancer diagnostics using the protein pattern of blood platelets as sensitive marker of cancer disease.

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